

**DESCRIPTION OF THE FINAL-INSTAR LARVA OF *NOTIOTHEMIS*  
*ROBERTSI* FRASER, 1944  
(ANISOPTERA: LIBELLULIDAE)**

**Viola Clausnitzer**

Zum Lahnberg 14, 35043 Marburg, Germany, e-mail: wesche@mail.uni-marburg.de

*This paper is dedicated to Philip S. Corbet on the occasion of his 70th birthday.*

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### **Abstract**

The final-instar larva is described from exuviae collected in the Kakamega Forest/West Kenya, and is compared with that of *Notiothemis jonesi*. A short description of one exuvia of *Tetrathemis corduliformis* collected at the same locality is given. The genus *Notiothemis* is compared with three other African Tetrathemistinae: *Tetrathemis corduliformis*, *T. longfieldae*, *Malgassophlebia aequatoris*. Notes on the habitat of *Notiothemis* and *Tetrathemis corduliformis* are added.

### **Introduction**

The genus *Notiothemis*, represented by *N. jonesi* Ris and *N. robertsi* Ris, is endemic to Africa. *N. robertsi* inhabits small rainforest pools in West, Central and East Africa. In some localities of Kenya and Uganda *N. robertsi* and *N. jonesi* occupy the same larval habitat. Little is known about larvae of most Tetrathemistinae. Recently the final-instar larva of *N. jonesi* has been described (Samways *et al.*, 1997).

### **Morphological description**

#### **Material and Methods.**

Seven male & 9 female exuviae: Kakamega Forest, West Kenya (00°08'-00°24'N, 34°20'-34°33'E; 1500-1700 altitude), December 1994-March 1995, V. Clausnitzer leg. Only exuviae unequivocally associated at the emergence side with the emerging or expanding imago were used for the description. Emergence occurred at night and early in the morning on vegetation about 30-40 cm above the water or the shore. The exuviae were measured and drawn, using a stereo-microscope. For detailed examination parts were softened in 75% alcohol and a microscope was used. Measurements were to the nearest 0,025 mm using a micrometric eyepiece.

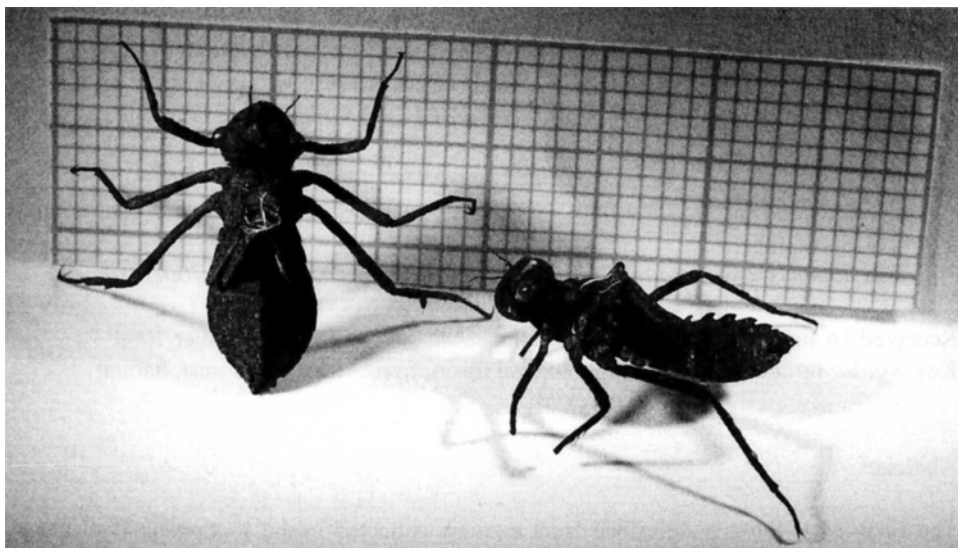


Figure 1. *Notiothemis robertsi*, exuviae, dorsal and lateral view, the smallest square in the grid measures 1mm<sup>2</sup>.

Habitus resembles that of the Sympetrinae except for the smaller eyes and longer legs (Fig. 1). The body is uniformly pale brown without spots or stripes. The postocular lobe of the head bears only very few small spiniform setae on the postocular lobe of the head. On the ventral side of the mesothorax six to eight spiniform setae are found at each side near the mesothoracic leg insertions (Fig. 2c). Antennae filiform and 7 segmented, the third segment being the longest and the sixth being the second longest (Fig. 2e).

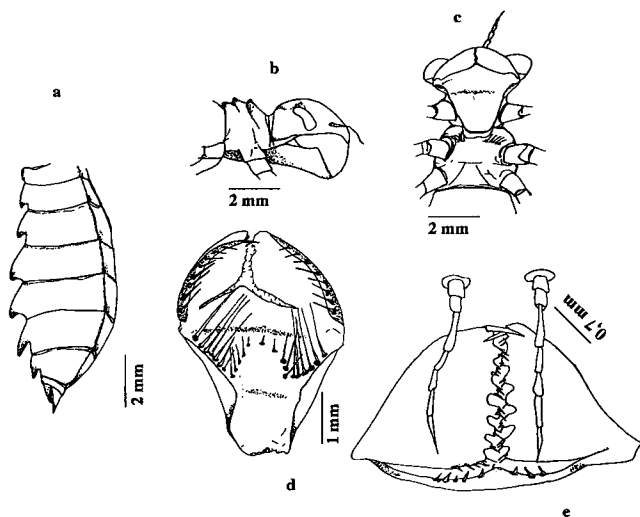


Figure 2. *Notiothemis robertsi*: a) abdomen, lateral view, right side; b) head, lateral view, right side; c) head and thorax, ventral view; d) labium, dorsal view; e) palpi and antennae, frontal view.

Labium wide and short, rounded; premental setae from 12 & 11 to 13 & 13 (Fig. 2d); palpal setae from 8 & 8 to 9 & 9 (Fig. 2d). Distal margin of palpus with 7 to 9 deep crenations; 3 (rarely 2 or 4) strong spiniform setae on each crenation (Figs 2e, 3a). Movable hook pointed and strong; as long as, or slightly longer than palpal setae. Mandibles with long, pointed incisors and molars (Figs 3b, 3c).

Legs long and slender with very sparse short spiniform setae. Abdomen ovoid, widest at segments (S) 6 and 7. Dorsal spines on S 1-3 (Fig. 2a). Segments 4-9 with large hook-like dorsal spines, increasing in size and length from S 4-8 (Fig. 2a). Lateral spines absent, pectinate setae on the lateral distal ends of S 7-9 (Fig. 3e). These short setae are arranged in an uninterrupted row on S 9 and in small groups on S 8 and S 7. Cerci half as long as paraprocts.

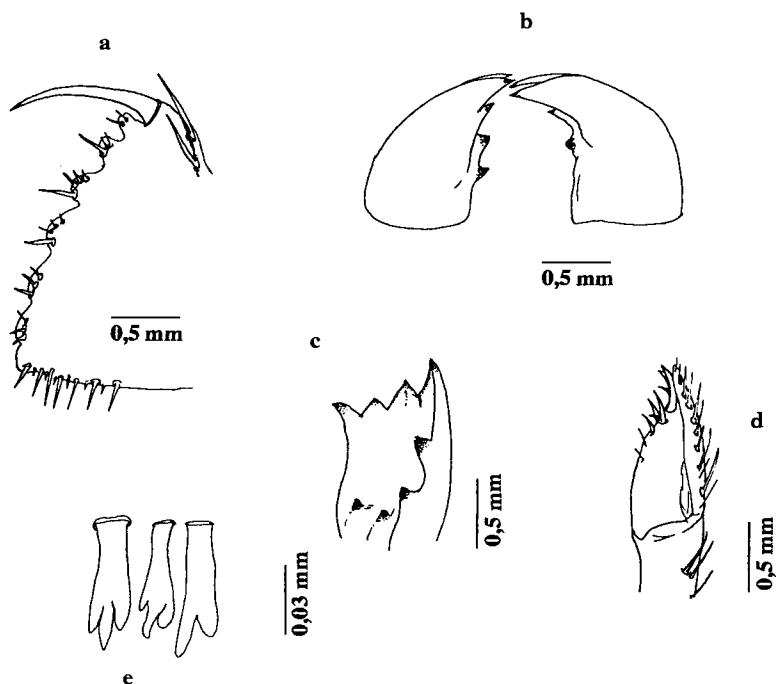


Figure 3. *Notiothemis robertsi*: a) distal margin of palpus, dorsal view; b) mandibles, anterior side; c) postero-medial view of proximal teeth of the left mandible; d) right maxilla, anterior side; e) pectinate setae of distal margin of S9.

## Habitat

*Notiothemis robertsi* breeds in small shaded pools in the rainforests of West, Central and East Africa (e.g. Corbet, 1962; Pinhey, 1961). The eggs are laid well above the water (Clausnitzer, 1997). The depth and aquatic vegetation of such pools can vary widely. Larvae develop together with those of other Tetrathemistinae larvae in decomposing organic litter on the pool bottom. Other odonate larvae, associated with *N. robertsi* in such

pools, include species of *Ceriagrion*, *Chlorocnemis*, *Orthetrum* and *Tetrathemis*. Larvae of these genera were found emerging from pools, whereas for species of *Macromia* and *Gynacantha* egg laying, but no emergence was observed. Information about biotopes of *Notiothemis robertsi* are given by Corbet (1961), Legrand (1977), Lempert (1988) and Miller (1995).

### Notes on *Tetrathemis corduliformis* Longfield, 1936

I obtained only one, not very well preserved, final-instar exuviae of *Tetrathemis corduliformis*, for which I could be sure of the determination on account of finding the expanding adult unequivocally associated with the exuviae at the emergence side. The notes below are intended only to distinguish this species and *Notiothemis robertsi*.

In size *T. corduliformis* resembles small *N. robertsi*, but the metatibia is longer than that of the average in *N. robertsi*. The labium appears more oval. On segment 9 are distinct lateral spines.

### Discussion

Little is known about the African Tetrathemistinae in general. Most species inhabit rainforest, and resemble each other in appearance and adult behaviour (Clausnitzer & Lempert, 1998). Likewise, very little is known about the larval morphology and ecology of African Tetrathemistinae. McCrae & Corbet (1982) describe larval habitats of the savannah species *Tetrathemis polleni* (Sélys).

The external morphology of the final-instar larva of *Notiothemis jonesi* has been described by Samways *et al.* (1997). To compare measurements (Table 1) of these two species I chose the features used for *N. jonesi* by Samways *et al.* (1997). All further notes on the final-instar larvae of *N. jonesi* are taken from Samways *et al.* (1997).

The dimensions of all characters except one are greater in *Notiothemis jonesi* than in *N. robertsi*. The most obvious difference between the two species lies in the dorsal abdominal spines (Figs 1 & 2a). In *N. robertsi* they are strong and hook-shaped, whereas in *N. jonesi* they are much less pronounced and only the dorsal keel on segment S 4 has an evident spine (Samways *et al.*, 1997, Fig. 2d). The pectinate setae on the lateral distal end of segments S 7-9 have the same size and shape as described for *N. jonesi*.

As observed for *N. jonesi*, males and females of *N. robertsi* differ in size (Table 1). The median dimensions of most characters are greater in the males.

Descriptions of the larvae of *Tetrathemis longfieldae* (Kimmins) (Legrand, 1977), *Malgassophlebia aequatoris* Legrand (Legrand, 1979) and my own observations on *T. corduliformis* show that larval size and proportions of these Tetrathemistinae resemble *N. robertsi* and *N. jonesi*. The most striking differences between final-instar larvae of *Notiothemis* and of the other two aforementioned genera of Tetrathemistinae are the more prominent dorsal keels even on the segments S 2-4 and the lateral spines on S 8-9 in the latter. *M. aequatoris* has long lateral spines on S 7-9, whereas *T. longfieldae* has such spines on S 8-9 and *T. corduliformis* only on S 9. The Australian Tetrathemistinae,

*Nannophlebia risi* Tillyard and *N. mudginberri* Watson & Theischinger, also have distinct lateral abdominal spines (Hawking, 1986).

Table 1. Median and range (mm) for 16 final-instar exuviae of *Notiothemis robertsi*.

|                                      | Males (N= 7) |             | Females (N= 9) |             |
|--------------------------------------|--------------|-------------|----------------|-------------|
|                                      | median       | range       | median         | range       |
| total body length                    | 13.80        | 13.2 - 14.7 | 12.70          | 12.0 - 13.5 |
| distance between antennae insertions | 1.00         | 0.93 - 1.2  | 0.89           | 0.76 - 0.96 |
| antennae length                      | 2.01         | 1.85 - 2.13 | 1.89           | 1.73 - 2.01 |
| prementum length                     | 3.13         | 2.8 - 3.15  | 2.95           | 2.75 - 3.25 |
| labium length                        | 3.83         | 2.75 - 4.4  | 3.70           | 3.63 - 4.05 |
| labium width                         | 3.25         | 2.78 - 3.4  | 3.03           | 2.58 - 3.28 |
| metatibia length                     | 3.40         | 2.75 - 3.75 | 3.25           | 2.72 - 3.3  |
| abdomen length                       | 8.40         | 7.1 - 8.9   | 7.70           | 6.4 - 8.2   |
| S6 minimum width                     | 4.80         | 4.1 - 5.8   | 4.50           | 4.2 - 4.9   |
| S8 minimum width                     | 3.75         | 3.1 - 3.9   | 3.55           | 3.3 - 3.95  |
| S9 minimum width                     | 2.10         | 1.95 - 2.4  | 2.10           | 1.95 - 2.35 |
| anal pyramid width                   | 1.41         | 1.14 - 1.52 | 1.17           | 1.03 - 1.4  |
| epiproct length                      | 0.79         | 0.72 - 0.87 | 0.73           | 0.69 - 0.85 |
| epiproct width                       | 0.70         | 0.43 - 0.94 | 0.61           | 0.52 - 0.75 |
| cercus length                        | 0.48         | 0.42 - 0.6  | 0.46           | 0.39 - 0.48 |
| cercus length/epiproct length        | 0.61         | 0.48 - 0.73 | 0.64           | 0.47 - 0.83 |

A distinguishing final-instar character for larvae of *N. jonesi* and *N. robertsi* is the absence (in *N. jonesi*) or presence (in *N. robertsi*) of dorsal abdominal hooks. Possible differentiating features between *Notiothemis* and other genera of Tetrathemistinae are the presence (in other genera) or absence (in *Notiothemis*) of lateral abdominal spines.

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